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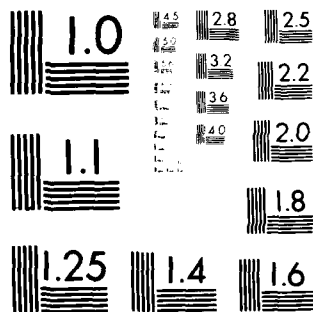
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A THREE-STAGE MODEL OF HOUSING SEARCH

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INTRODUCTION

Despite its importance in the residential mobility process, housing search as a determinant of moving behavior has been given scant attention in literature on the subject. Although limitations of data have contributed to this oversight, in large part it reflects the narrowness of particular disciplinary approaches, which typically focus on moving per se and thus simplify what is in fact a complex and multifaceted mobility process. As a result, even those studies which acknowledge the importance of the search process have failed to focus on it in a satisfactory way. Such studies divide into two types: formal models of the decision to move (Speare et al., 1975; Hanushek and Quigley, 1978) that recognize housing search as a transaction cost but rarely examine search behavior; and descriptive studies of search activity (Barresi, 1968; Hempel, 1969a and 1969b; Barrett, 1973) that lack a satisfactory theoretical structure for assessing how search affects mobility. Consequently, too little is understood about how households' moving decisions are shaped by the perceived benefits and costs of moving, how households' uncertainty about those benefits and costs influences their decisions to undertake an active search, or how various search costs affect moving behavior.

The substantive importance of the search process is suggested by several explicit mobility models that have recently appeared in the literature (Speare et al., 1975; Hanushek and Quigley, 1978; Brummell, 1979). Although differing on specifics, these models share certain common features: (1) a behavioral approach, focusing on the separate influences on the decision-making process; (2) recognition (implicitly) of mobility as a mechanism of consumption adjustment, with the inclusion of measures of current housing consumption in the decision-making process; and (3) a focus on the decision to move per se, typically ignoring the type of consumption adjustment that moving produces. By focusing on the behavioral aspects of mobility and its role in the housing adjustment process, these models emphasize the consumption rather than the spatial

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aspects of moving. As such, they represent a significant advance over prior models that regarded local residential mobility and migration, both of which entail spatial relocation, as fundamentally alike.

Despite this valuable insight, those models rarely examine in any detail the "consumer behavior" that mobility entails, that is, how a household goes about trying to find a new residence. This may be a significant omission, because moving is a complex behavior entailing a series of choices rather than a single decision or behavior. Those choices, which may not all be present in every case, include the decisions to consider moving, to undertake an active search, and whether and where to move (Rossi, 1955; Brown and Moore, 1970). Because the search stage intervenes between the decision to consider moving and the actual move, the characteristics of the search are likely to play an important role in determining whether households are able to make their desired adjustments when they move. Moreover, insofar as the determinants of the separate stages differ, an understanding of the search process is essential to a complete analysis of moving behavior (Wolpert, 1965).

Lacking a fuller treatment of the search process and how it impinges on moving behavior, most mobility research has limited policy applications. Such applications would be useful to the design of programs to alleviate the housing problems of low-income households and to expand the residential choices of minority households. For example, in designing programs to remedy the housing problems of low-income households, the federal government has traditionally relied on a supply-side strategy in which benefits are tied to subsidized units that eligible households must occupy to receive assistance. The cost and locational inflexibility of such programs have recently prompted policymakers to consider demand-oriented alternatives in which assistance would be given directly to recipients, who, using the subsidy to supplement their incomes, could then afford safe, sanitary, and decent housing in neighborhoods of their choice.* The potential success of demand programs is predicated on the

*The cost differential between supply and demand programs stems from the former's emphasis on new construction versus the latter's on maintaining existing structures. The difference in locational flexibility is a necessary by-product of the fact that the one ties subsidies to units and the other to recipients.

assumption that given adequate resources, low-income households will be able to negotiate successfully for themselves in the open market. Without a more complete understanding of the search process, however, it is impossible to judge whether beyond the obvious constraints imposed by their low incomes, poor households face other less fully recognized constraints that hamper their ability to search for and find better accommodations.

Similarly, the Department of Housing and Urban Development (HUD) has equal housing legislation and low-income assistance programs to further its goal of promoting residential integration. For a variety of reasons, neither of these approaches has proven to be very successful. Thus, despite evidence indicating that minority households continue to prefer integrated neighborhoods and white resistance to integration is declining (see Pettigrew, 1973; Taylor, 1978; Taylor et al., 1979 racial residential segregation remains quite high (Sorenson et al., 1975). Clearly, if the government is to design programs that will be effective in furthering its integration goals, it needs more information about the housing search process and its effects on neighborhood choice.

This paper describes a model for analyzing the search process and how it affects the types of adjustments households make when they move. This model has been developed in conjunction with a research project supported by HUD to determine whether the transaction costs of moving--that is, the time, effort, and monetary costs involved in locating and moving to a new residence--impede the overall effectiveness of mobility as an avenue by which households can improve their housing. The answer to this question, particularly as it relates to households of special policy interest (e.g., those who are elderly or minorities or have low incomes), should have direct relevance to federal housing policy. If, for example, the principal factor limiting the consumption options of a low-income household is its resource level, then the extent of housing improvements stimulated by a demand-oriented assistance program will be limited only by the extent of the subsidy and the household's preference for housing vis-à-vis other goods. On the other hand, if the transaction costs of moving substantially discourage potential recipients from looking for better housing or limit the types of adjust-

ments they try to make, additional features would have to be incorporated into assistance programs.

Although no comprehensive analysis of transaction costs currently exists with which to answer those questions, several recent empirical studies (Abt, 1977; Newman and Duncan, 1979; McCarthy, 1979 and 1980) and at least one theoretical paper (Smith et al., 1979) have suggested that the costs of searching and relocating are substantial and can significantly affect moving behavior. Moreover, one set of investigators, commenting on the apparent failure of the experimental housing allowance program to increase recipients' mobility, concluded that the allowance payments were insufficient to overcome the constraints on low-income households' mobility that are built into the operation of the housing market (Abt, 1977).

Without a systematic analysis, however, it is impossible to determine which types of transaction costs are most significant, how they affect a household's moving behavior, and what policy options might be successfully employed to overcome those effects. For example, if required deposits or direct moving expenses were the principal deterrents, a special mobility allowance might be called for. If the effort needed to find a suitable residence were the problem, special relocation information or assistance might be suitable. Finally, if discrimination were the most important factor, strict enforcement of equal opportunity laws would be necessary.

The model discussed here is designed to inform these issues by demonstrating not only whether transaction costs affect mobility but also which costs are most important. Moreover, by indicating which types of households are most sensitive to specific costs and how those costs affect different aspects of the adjustment process, this research will not only provide useful information for policymakers but will also offer considerable insight into the entire mobility process.

The next section, introducing the search model, begins with a discussion of the concepts underlying the model. It then compares this framework with others in the literature. It concludes with a presentation of the model and a discussion of its strengths and weaknesses. The paper's final section discusses the data, including the analysis samples and variables, to be used in the research.

ANALYTICAL FRAMEWORK

The conceptual framework underlying this research shares certain characteristics with recent behavioral models of mobility but extends them by emphasizing transaction costs and how they impinge on moving behavior. This section describes the conceptual framework underlying the research, compares that framework with those of other approaches, and then introduces the three-stage search model.

Underlying Assumptions

Several assumptions about the residential mobility process underlie the search model used here. These assumptions relate to: (1) the household's efforts to adjust its consumption of housing, (2) its position vis-à-vis a hypothetical equilibrium between desired and actual housing circumstances, (3) the search costs a household is willing to absorb, and (4) the separate decisions which, in sequence, culminate in a move.

Our first assumption posits that most local moves are motivated by a household's desire to adjust its housing consumption. In this respect, residential mobility contrasts sharply with migration, since migrants are typically viewed as investors in their own human capital who move in anticipation of the employment and income benefits to be reaped at their new destinations (Da Vanzo, 1977; Greenwood, 1975). From our perspective the spatial aspects of residential mobility are incidental to its function as a mechanism for consumption adjustment: What the household is doing relates first and foremost to housing. Whether or not this adjustment entails moving depends on how the household perceives the advantages and disadvantages (benefits and costs) associated with moving. Households implicitly weigh those benefits and costs and move only when it seems advantageous to do so. Benefits here include the housing and neighborhood improvements that may be realized by moving, such as more space or a safer neighborhood. Costs include those required to find alternative housing and then to change residences. Specific search costs may include direct expenses (for example, commissions paid to agents), the effort spent trying to find a unit, and any psychological costs resulting from encounters with discrimination. Relocation costs, in turn, include the direct expense of moving household

goods, foregone earnings on money required for utility or security deposits, potential loss of rent discounts renters sometimes enjoy in prior units, and the closing costs that owners face when buying a home.

Our second assumption posits the notion of equilibrium. The benefits of moving, and thus the likelihood that a household will contemplate a move, will depend partly on how distant the household is from (or close to) some hypothetical state of equilibrium between its desired and actual housing circumstances. Depending on that balance, households may seek to improve the fit between what they have and what they need, either by increasing or reducing their level of consumption. For example, a young couple expecting a child may need another bedroom, whereas an older couple whose children have left home may find they are consuming and paying for more than they need.

Third, we assume that because households never have perfect information with which to make their housing choices, they typically search out alternatives to gain a better assessment of the benefits and costs of moving. How they conduct this search occupies a central place in our conceptual framework. Specifically, we assume that the household embarks on a search without knowing how much searching will be necessary or even whether it will prove sufficiently fruitful to justify the effort. We further assume that difficulties experienced during the search, particularly discrimination, may force households to revise their original expectations, modify their moving goals, or even to terminate their search and postpone moving. The search costs that a household is willing to absorb will depend on the benefits it expects to receive and how long it expects to receive them.

Finally, this framework explicitly assumes that residential mobility typically entails a series of analytically separate decisions or behaviors, including the decision to consider moving, the decision to undertake an active search, and the decisions of whether and where to move. By explicitly recognizing that more than one decision is involved in the mobility process, this approach also acknowledges that there is more than one behavior to explain and that the determinants of each behavior need not be the same. This final point is especially important, because many analysts have restricted their focus to the single variable--whether

households actually move. However, if the importance of a particular class of variables changes at different stages of the mobility process, a model using a single dependent variable will not be able to capture that change and may obscure the importance of that class of factors altogether.

Comparison With Other Analytical Frameworks

In its general outline, this framework closely resembles those of other mobility models. For example, most models, acknowledging the reasons prior research has demonstrated households report for moving (Morgan, 1972; Bureau of Census, 1966) agree that residential mobility is primarily consumption related. Similarly, most models contain some notion of benefits and costs, assume that households will consider moving when they believe some other residence offers greater benefits than their current units, and will decide to move when the expected benefits of moving exceed its costs.

Of course, the terminology used to refer to benefits and costs, how they are measured, and the specific advantages and disadvantages of particular models often differ considerably (Quigley and Weinberg, 1977). Economists, for example, explicitly incorporate the benefit/cost tradeoff in their mobility models by asserting that the probability of moving is a function of the household's expected moving benefits and costs. Moving benefits refer to the household's expected gain in utility, which is typically measured in terms of the income equivalent gain that households can expect to receive by bringing their actual consumption into closer balance with their "equilibrium" level of consumption. Moving costs are also measured in dollars by summing direct dollar expenditures and an estimated income-equivalent value (the opportunity costs) of the time and effort expended in searching for a new unit (Abt, 1978; Hanushek and Quigley, 1978; Cronin, 1978).

By explicitly assigning dollar values, the economic models attempt to obtain an objective measure of the benefits households can expect from moving. Similarly, by incorporating the monetary value of moving costs, these models seek to measure the tradeoffs involved in the mobility decision directly and thus provide more policy leverage than

models that rely on more subjective measures. There are, however, some potentially serious problems with the way the economic models measure both benefits and costs. Potential moving benefits, for example, are typically estimated in terms of the difference in the volume of services households consume in their current residences and an estimated equilibrium volume of services. The greater this difference, whether positive or negative, the greater the presumed utility households can gain by moving. The equilibrium level of services is, in turn, estimated in terms of total housing expenditures by assuming that expenditures, when adjusted for price discounts, and so on, accurately capture differences in the volume of services consumed. However, the utility a household derives from housing is determined not simply by the total volume of services consumed but also by the specific attributes of the housing bundle. Since housing is a multidimensional good and different combinations of attributes can command the same price, measures of volume alone can never measure the household's expected utility gain. This problem may contribute to the fact that in most economic models, measures of costs typically perform better than measures of benefits (Cronin, 1978; Weinberg et al., 1979).

There are also problems with the economic model's attempt to measure moving costs. Although such costs as direct relocation expenses, length of stay discounts, and closing costs either are already or can easily be measured in dollars, the value of search time and effort (which are measured in terms of their opportunity costs), and the psychological costs of discrimination are much harder to evaluate in dollar terms. Finally, by collapsing the cost measures into a single value, the economic model often overlooks the relationships between these costs (e.g., discrimination and search effort), and thus the opportunity to determine the impact of individual cost items on moving behavior.

Geographers and sociologists, on the other hand, although utilizing similar concepts, define and measure them in different ways. Geographers, for example, refer to residential stress and resistance to moving rather than benefits and costs. Residential stress refers to the pressure to move arising from a household's dissatisfaction with its residence. Stress is measured in terms of the household's evaluation of various

attributes of its unit and location, or what is referred to as the household's experienced place utility (Clark and Cadwallader, 1973). The difference between experienced place utility and aspiration place utility (the amount of stress relieved by moving) defines the benefits of the move (Brummell, 1979). Mobility resistance (moving costs) is less well defined, but unlike costs in the economic model, includes both monetary and nonmonetary elements; for example, both direct relocation expenditures and the emotional costs of breaking ties to prior residences (see Wolpert, 1965; Brown and Moore, 1970; Huff and Clark, 1978; Smith et al., 1979).

Sociologists refer to residential satisfaction rather than utility or residential stress, and assume that the benefits to be gained are reflected in the increased satisfaction that results from moving. Measures of a household's expected benefits are obtained by asking respondents how satisfied (or dissatisfied) they are with the current residence and whether they plan to move. Like geographers, sociologists have not clearly delineated the costs of moving but agree they are important and include both monetary and nonmonetary factors. Variables that identify those characteristics of households that might inhibit their mobility are often used in sociological and geographic models to capture the effects of moving costs.

Although neither the geographic nor sociological models of mobility contain a direct equivalent of the economist's notion of equilibrium, both assume that households implicitly weigh their level of residential stress or dissatisfaction against some intuitively recognized threshold or aspiration level in deciding whether to move. When the level of either stress or dissatisfaction exceeds the threshold, the probability of moving increases. Since the household's threshold or aspiration level, like the economist's notion of equilibrium consumption, is assumed to be determined by household characteristics, the household's level of stress or dissatisfaction relative to its threshold operates in essentially the same way as the economist's notion of disequilibrium.

By incorporating multiple indicators of housing and neighborhood characteristics, the geographic and sociological models are better equipped than the economic model to identify which aspects of a household's current

housing circumstances have the strongest effect on its overall mobility. Moreover, the subjective nature of some housing circumstance variables used in these models may be a more appropriate determinant of mobility (or at least of the decision to search) than the single "objective" benefit measure, because before a household actually searches, the best indicator of whether it could benefit from moving is its current housing circumstances. Indeed, two studies that included both objective and subjective measures of housing circumstances found the subjective variables to be better predictors of the decision to search (Cronin, 1978; Atkinson and Weinberg, 1979). However, the treatment of moving costs in these models has several weaknesses. First, it obscures the benefit/cost tradeoffs inherent in the adjustment process by attempting to capture those tradeoffs indirectly. Second, by using household characteristic variables to capture the effects of moving costs, these models potentially confound the effects of household characteristics on moving costs with their effect on the propensity to experience changes in circumstances that could also trigger mobility. Finally, by excluding direct measures of moving costs, this approach offers no policy leverage for changing mobility behavior.

Each of the three approaches discussed here recognizes that a household's decision to move, based as it is on an evaluation of benefits and costs, is only the final stage of a complex process. However, only some of those models incorporate all of those stages and few, if any, analyze how the process itself affects the housing adjustments movers make. Often, such models examine only whether a move occurs (Weinberg, 1979), although some also consider the decision to search either directly (Cronin, 1978; Hanushek and Quigley, 1978) or indirectly by analyzing moving plans (Speare et al., 1975; Goodman, 1976). Both approaches run the risk of misspecifying the effects of a particular variable that influences only one stage of the process and miss the opportunity to identify how the process itself shapes the eventual outcome. Thus, it may be difficult with such models to explain why some households who are dissatisfied with their current housing do not search, why some households who search do not move, or how difficulties experienced during the mobility process, such as discrimination, affect its outcomes.

A Three-Stage Search Model

While incorporating elements from other mobility models, the approach used here avoids many of their problems by employing what might be called a three-stage search model. This model separates moving into three separate stages: first, the decision to engage in an active search; second, the search itself; third, the outcome of the search. The model is designed to explain which households search, what procedures they use, and how these procedures influence moving behavior.*

The first stage estimates the probability that a household will conduct an active search as a function of its current housing circumstances, h_i , its demographic and economic characteristics, g_i , and its prior market knowledge, k_i :

$$P(S) = f(h_i, g_i, k_i) \quad (1)$$

The benefits of moving are introduced into this model through the housing circumstance variables (h_i), which will include both objective condition and subjective rating measures. Although other models have used this procedure, our approach differs by using several indices of housing circumstances. There are several reasons for this decision. First, multiple measures avoid the problems of a single predictor of benefits based on the volume of housing services. Second, this approach enables us to determine if the stimulus to move varies across housing dimensions or for different types of households; for example, low-income households may be particularly sensitive to housing costs while families with children may be more responsive to neighborhood problems. Third, we assume that before a household actually searches, the best indicator of whether it could benefit from moving is its own evaluation of its current housing situation.

*By focusing on moving among searchers rather than among all households, this approach necessarily loses total closure on mobility, since not all households search before moving. This exclusion is purposeful. This research focuses on how the search process affects moving behavior. It would clearly be inappropriate to include "windfall" movers--those who did not search.

Before a household engages in an active search it will not have a firm estimate of either its search or its relocation costs and thus the likely net benefit of moving. Nevertheless, households are able to form expectations about those costs based on their characteristics, and the household characteristic variables (g_i) reflect the conditioning effect those factors can have on the probability that a household will search. For example, a household whose housing needs are unstable may be reluctant to move in response to low expected benefits since that instability will limit the period over which it can reasonably expect to amortize its transaction costs. Similarly, a household expecting higher search or relocation costs may be less inclined to search than one that does not.

Finally, measures of a household's prior market knowledge (k_i) are included because we assume that a household's need to conduct an active search will depend on its prior familiarity with the alternatives available in the market. Thus, recent movers, having already become familiar with the alternatives available, may have less need to conduct an active search than those whose market information is out-of-date. Prior research offers some support for this assumption by indicating that between 10 and 25 percent of all movers claim to have made their decisions without engaging in an active search (Rossi, 1955; Barrett, 1973).

With respect to the search procedures used, we assume that when households embark on a search, they are in effect gambling. They can only guess at how much searching will be necessary, and the outcome may not justify their efforts. These uncertainties lead households to adopt widely different strategies for deciding how much effort to expend and what information sources to use. At one extreme, the costs of searching might be minimized by abstaining from any activity at all--essentially doing nothing more than remaining alert to "windfall" discoveries picked up from information from friends or casual perusal of the market. At the other extreme, a household might maximize its chances of locating the best available alternative by continuous and thorough search--looking for months and considering dozens of alternatives. Most households fall between these two extremes, of course, or alter their search procedures as they become familiar with what the market has to offer.

Our model assumes that the search strategies households adopt will be influenced by the same three factors that determine whether a household undertakes an active search: (1) current housing circumstances (h_i), (2) demographic and economic characteristics (g_i), and (3) familiarity with the market (k_i). Unlike the decision to search, however, the household's search strategy will also be shaped by (4) events occurring during the search (d_i).

$$\text{Search Procedures} = f(h_i, g_i, k_i, d_i) \quad (2)$$

The household's evaluation of its current housing circumstances will influence the choice of strategy by shaping its expectations about the benefits it can expect from moving and thus, the search costs it can reasonably afford. Households whose current housing is generally satisfactory, and thus might expect only minimal benefits from moving, may be only "passively alert," but those that are in substantial disequilibrium can be expected to search actively.

A household's characteristics will influence the type of unit it seeks and, correspondingly, the procedures it adopts to look for one. Households looking to purchase homes, for example, are far more likely to consult real estate agents than are searchers looking for rental units. The costs of alternative search methods will also vary with a household's characteristics, and thus will affect the likelihood that such methods will be adopted. For example, for some households, age or employment circumstances raise the costs of their personally examining alternatives, while others may find that their best strategy is to rely primarily on their own efforts. Circumstances affecting how long a household expects to remain in the unit or whether it can expect to encounter discrimination may also affect the effort it is willing to exert to find a suitable residence. Thus, renters, who move far more frequently than owners, generally spend less time searching and look at fewer units than owners.

A household's previous familiarity with the market should also influence its search strategy. Most households, since they enter the market infrequently, are unfamiliar with the options available. They

must first explore the market to establish criteria for choosing a new unit and then locate and rank alternatives (Silk, 1971). Some households, however, have recently searched for housing, and their prior experience should reduce the effort they must expend to locate an acceptable unit.

Difficulties households encounter while searching will also influence search strategies. Such problems may cause a household to alter its initial strategy or even abandon its plans to move altogether. For the most part, these problems are of the type consumers generally face when they enter a market and can be attributed to such things as inadequate market knowledge, limited supply, etc. However, some households face special difficulties in their search because they are discriminated against in the market. Whether due to race, income, or family circumstances, discrimination increases a household's search costs by subjecting it to humiliation or hostility and forcing it to expend more effort to find a suitable residence.

The specific effects of discrimination on search costs will be estimated through a two-step procedure. The first step entails estimating a regression equation in which a measure of search effort, such as the number of units examined, is regressed on the basic determinants of search procedures, that is, current housing circumstances, household characteristics, and familiarity with the market. The second step entails reestimating the equation with the discrimination variables included.* Their coefficients will indicate how each type of discrimination affects the number of units examined. Comparing the coefficients of the nondiscrimination variables between the two equations should, in turn, indicate whether any part of the differences in search effort among various population groups in the first equation are due to the differential effects of discrimination. Finally, a comparison of the explanatory power of the two equations will indicate how much of the

*Since the policy significance of different types of discrimination could vary (e.g., racial discrimination vs. discrimination against pets), variables identifying separate types of discrimination will be used. The data enable us to identify eight different sources of discrimination: age, sex, marital status, race, nationality, source of income, children, and pets.

actual difference in search behavior is attributable to background factors and how much is due to discrimination.

The final stage of the model focuses on the outcomes of the search. Unlike traditional models that measure the outcome of the search in terms of whether or not households move, our model examines the effects of search costs on both the decision to move and the types of adjustments movers make. There are two reasons for employing a more extended measure of search outcomes. First, the determinants of the decision to move and the choice of a new unit are not identical. Second, search and relocation costs are unlikely to have comparable impacts on these two decisions.

Unlike the choice of a new unit, the decision to move is directly related to a household's current housing circumstances, since it is the lack of fit between the household's current housing consumption and its desired or equilibrium consumption that motivates the decision to move. The type of adjustment a household makes when it moves, on the other hand, bears no necessary relationship to its prior housing circumstances because it is the household's current housing needs that determine its desired consumption adjustment. Thus, it is not surprising that the explanations local movers give for deciding to move do not correspond at all closely with their reported reasons for choosing their new residences (Butler et al., 1969).

Although the transaction costs of moving can affect both the decision to move and the type of adjustment movers make, it is unlikely that these two effects will be comparable. Probably the most severe effect moving costs can have on mobility behavior is to dissuade a household that has actively searched from moving. Such households receive nothing in return for the time and energy invested in searching and may also be forced to tolerate the conditions that first caused them to search.* Thus, rather than causing searchers to forego moving, a more likely effect of moving costs is that it will affect the size and character

*Alternatively, households who stop searching without moving may decide to improve their current unit or change the household circumstances that prompted the decision to search.

of the adjustment made. For example, moving costs may persuade a household to select the first acceptable unit rather than continue to search for the best available unit. Alternatively, moving costs could force households to modify their consumption of the various components of the housing bundle; for example, a household experiencing discrimination when searching in a preferred neighborhood might decide to trade off neighborhood quality for a larger and better quality unit in its original neighborhood.

Since our model treats the decision to move and the type of adjustment made as separate outcomes of the search process and since the determinants of these two outcomes are assumed to differ, two separate equations are used to model these outcomes. The first equation focuses on the decision to move and estimates the probability that a household will move given that it conducted an active search. This probability is assumed to depend on current housing circumstances, h_i , the costs of searching, c_i , the search procedures used, s_i , and household characteristics, g_i ,

$$P(M/S) = f(h_i, c_i, s_i, g_i) \quad (3)$$

The housing circumstance measures are once again assumed to identify the potential benefits of moving. The search-cost variables capture the effects of expected relocation costs, the costs of searching, and any special problems including discrimination that households may have experienced during the search. The search-procedure variables will identify the number and types of information sources used and the areal extent of the search. Finally, the household characteristic variables provide a necessary control for those factors.

The last stage of the model then estimates how relocation and search costs affect the type of adjustments households make when they move. Those adjustments are assumed to depend principally on the household characteristics, g_i , (including any changes in characteristics) that may have precipitated the move. However, a variety of moving costs, the c_i 's, including discrimination and the effort needed to find a unit, may force households to modify the nature of the adjustment they make.

Similarly, some search techniques and procedures may be more effective than others. Consequently, variables identifying those factors, the s_i , are also included in the model.

$$\text{Type of Adjustment} = f(c_i, s_i, g_i) \quad (4)$$

No specific consumption change measure is included in equation 4, because several different dimensions of that adjustment will be examined. Those dimensions will include objective measures of the difference in consumption between pre- and postmove units, $H_{1i} - H_{0i}$, and of the price households pay for their new housing. The objective measures of consumption change, consisting of both the total change in the volume of housing services consumed and the change in each of the three principal dimensions of the housing bundle (space, unit quality, and neighborhood) will be estimated using hedonic index equations, which place a dollar value on the various attributes of the housing bundle based on their contribution to total rent, and the characteristics of old and new residences. The hedonic index can also be used to determine if renters paid a premium for their new units or got those units for a bargain. Since the hedonic prices are equivalent to the average rent for any given housing attribute, differencing the actual rent from an estimated rent obtained by multiplying attributes by their predicted prices should indicate whether a household is paying more or less than average rent for a given unit, that is, whether they paid a premium or found a bargain.*

Each of these "objective" measures takes into consideration only the outcomes of moving and ignores the ways households may have compromised their premove preferences to lower their moving costs. While the nature of those tradeoffs can be inferred from examining how moving costs affect the adjustments of otherwise similar households who face differential costs, such a procedure is indirect. To examine those compromises directly, we will also compare three measures of expressed premove preferences against actual moving outcomes. The three expressed

*This technique is demonstrated in McCarthy (1980).

preferences include preferred tenure and unit type and the expressed desire to change neighborhoods.

Strengths and Weaknesses of the Search Model

Like all behavioral models, the three-stage search model described here has both strengths and weaknesses. The strengths of the model arise from the advantages it has over alternative models for identifying and estimating how search and relocation costs affect residential mobility. Those advantages are several. First, the model explicitly recognizes that the transaction costs of moving can affect moving behavior in a variety of ways and facilitates direct testing for those alternative effects. Second, this approach enables us to estimate and compare the effects of individual cost items, for example, search effort versus discrimination, on moving behavior. Third, by including measures of moving benefits and explicit moving costs as well as household characteristics in the model, this approach enables us to examine directly the benefit/cost tradeoffs involved in most mobility decisions as well as how those tradeoffs differ for different types of households. Finally, this approach provides direct policy leverage by identifying how specific search costs can affect different aspects of the consumption adjustments households make when they move.

The two principal problems with this search model are the way it measures the potential benefits of moving and its failure to incorporate measures of housing supply. Unlike the economic models that attempt to derive a single "objective" measure of potential moving benefits, our model proposes to use a series of objective and subjective measures of premove housing circumstances as indirect indicators of the benefits households can expect to receive from moving. However, neither the economic approach nor the multiple indirect indicator approach used here is without its pitfalls. The single benefit measure, as noted above, ignores the multidimensional character of housing and the fact that households derive utility from the consumption of attributes. Moreover, the accuracy of attempts to expand the objective measure approach to incorporate the multiple dimension of housing rely on untested assumptions about the demographic and economic determinants

of demand, the distribution of attribute prices, the identification of a standard population consuming optimal housing, and the appropriate utility function to use in estimating optimal consumption. Without verification of these assumptions, the degree to which such direct benefit measures are truly "objective" is open to question.

The indirect indicator approach proposed here, on the other hand, although recognizing the importance of individual housing attributes to a household's potential benefits, fails to provide a direct link between the household's current consumption and the benefits it could expect to reap by moving. This problem may not be particularly troublesome with respect to the household's decision to search or the choice of search procedures, since one could reasonably argue that current levels of stress are more salient to these decisions than some indeterminate perception of potential benefits. However, once a household has actually searched and consequently has a clearer idea of those benefits, the problem may be more severe. Indeed, Cronin's (1978) results indicating that measures of dissatisfaction are better predictors than direct benefit measures of the decision to search (whereas the reverse is true of the decision to move after a search has been conducted) suggest that is the case. One could, of course, assume that a household's evaluation of its current housing is implicitly made relative to its perception of the alternatives available in the market. As such, a household's evaluation of its current unit would necessarily reflect, even if at times inaccurately, the potential benefits it could expect from moving (Adler, 1979). Unfortunately, this assumption cannot be tested with our data. However, if, as the model assumes, transaction costs are more likely to influence the type of adjustment made than the decision to move, then using an indirect measure of potential benefits will not have a significant effect on the results.

A second potential problem with this model is its failure to incorporate supply variables. In theory, supply conditions will influence both search intensity and moving outcomes because searchers looking for scarce units may have to search harder and may not be able to find the type of unit they want. However, by omitting supply variables, our model implicitly assumes that all searchers face identical supply condi-

tions. Although that assumption is clearly unrealistic, given the variety of households and housing units present in most housing markets, choosing the appropriate supply measures is a difficult task, particularly since the data to be used in this analysis are drawn from two small, relatively homogeneous markets.* For example, previous attempts to capture the influence of supply conditions on moving behavior with vacancy and turnover rate data drawn from over twenty separate housing markets have not been successful (Goodman, 1978). Given the difficulty of specifying the appropriate supply measures, our model has excluded them.

THE DATA

One reason previous research has failed to examine housing search and its role in the complex mobility process has been the lack of data suitable for such an analysis. To a substantial degree, the data to be used in this research remove that barrier. In this final section we describe our data base, its organization and contents, and the characteristics of our analytical samples.

The data to be used in this research were collected as part of the Housing Assistance Supply Experiment (HASE), a multiyear social experiment conducted by The Rand Corporation under the sponsorship of the Department of Housing and Urban Development. HASE was designed to test the marketwide effects of a fullscale housing allowance program on two metropolitan housing markets: Brown County, Wisconsin, whose central city is Green Bay, and St. Joseph County, Indiana, whose central city is South Bend.** To monitor market changes, HASE conducted four consecutive annual surveys with the occupants of a panel of rental and ownership residential properties. Those surveys provide the data files for this analysis.

Two characteristics of those files make them uniquely well suited to this research. First, they provide a remarkable depth of information on households, their housing circumstances, and their search and moving behavior. As a result, the HASE data permit extensive compari-

*A description of the data to be used in this analysis is presented in the next section.

**A complete description of the Supply Experiment can be found in The Rand Corporation's *Third Annual Report of the Housing Assistance Supply Experiment*, R-2151-HUD, 1977.

sons of households and their housing circumstances in their pre- and postmove residences and thus remove the data barriers that have hampered prior analyses of moving behavior. Second, the HASE data provide complete coverage of two separate housing markets. Therefore, unlike other data files, which typically supply a thin sample of households from many separate markets or a dense sample of one subpopulation in a particular market, the HASE data facilitate detailed comparisons among all market sectors.

Although the HASE data provide a remarkable wealth of information about households and housing markets, the sample design poses one major problem for our analysis. HASE was chartered to determine how the supply of housing responded to the demand stimulus provided by housing allowances. Consequently, the sample was designed to monitor changes in the quantity and quality of housing services and utilized residential properties rather than households as the basic sampling unit. Although this sample design facilitates the construction of a longitudinal panel of housing units, using it to construct a longitudinal panel of households is a considerably more difficult task. Moreover, since complete four-wave panel records will exist only for households who have not moved during the survey period or who have moved between empaneled units, any longitudinal panel of households constructed from these data will be subject to severe selectivity bias.

However, two characteristics of the HASE survey data provide a method for resolving the sample design problem. First, each survey wave constitutes a probability sample of the households (occupied housing units) present in each site during a particular survey wave and therefore can be weighted to represent the population of households in the site. Second, in each survey wave all records contain at least one year's worth of data for respondent households. Recognizing these two facts, we propose to use single years of exposure as our basic analytical unit. Those units are constructed by decomposing longitudinal household records of unequal length into a common unit--the single year of exposure preceding the survey wave in which the household was interviewed. Relevant variables describing the household's characteristics, its housing circumstances, and its search and moving behavior

during that interval are then drawn from the individual household survey. Moreover, since all households who complete at least one survey provide a five-year retrospective mobility and housing history, the surveys contain the information necessary to describe the household and its housing at both the beginning and the end of the exposure interval. Once each household's longitudinal record is decomposed into standard time intervals, those intervals can then be aggregated to increase the effective sample size for comparisons of interest, since such an aggregation is equivalent to pooling four cross-sectional random samples.

Although exact sample sizes cannot be determined until the file is constructed, the combination of a large sample size (approximately 2,300 completed surveys are obtained at each wave in each site) and the aggregation procedure should guarantee sufficient sample for all phases of the analysis. For example, approximately 40 percent of the 2,300 households completing interviews in each wave conduct an active housing search during the preceding year. Thus, each site/wave combination should produce about 900 searchers. Of that total, about 75 percent (700 households) move, 15 percent (130 households) are still searching when interviewed, and the remaining 10 percent (90 households) terminate their search without moving.* Using these estimates as a rough guide, each site/wave combination should yield 2,300 records from which to estimate the probability of searching, 790 records with which to analyze search procedures and the effects of search costs on the decision to move, and 700 records with which to estimate the effects of search costs on the housing adjustments produced by the move. Aggregating individual exposure units will, of course, expand each of these estimates by a factor of four.**

A variety of sample exclusions will reduce these sample estimates somewhat. For example, movers who do not search (about 10 percent of the sample) will not be included in the sample used to estimate the

*These estimates are based on a review of survey marginals.

**Since households who had not moved in the five years preceding the baseline interview were not asked about their search behavior during that period, aggregating the individual exposure units will yield fewer unsuccessful searchers.

effects of search costs on the decision to move. Similarly, households moving into each site (migrants) will not be included in the sample used to estimate the effects of search costs on the housing adjustments of movers because the surveys did not collect detailed information on their prior residences. However, such exclusions will not seriously affect sample sizes.

Although a detailed description of the information collected in the HASE surveys is beyond the scope of this paper, Table 1 summarizes the variables available in the surveys. This summary sorts variables by general subject category and specifies, where appropriate, for whom that information is collected. This information will be organized to describe the characteristics of households and their housing at the beginning and end of the one-year exposure interval as well as to identify any search and moving activity that may have occurred within the interval. Since the interview itself terminates the exposure interval, the information on current household and housing characteristics provides the necessary end-period data. For households who do not move, data collected on changes in either their household or housing circumstances over the past year will be used to describe their circumstances at the beginning of the exposure interval. For households who move, information on their circumstances at the beginning of the interval is contained in the data on prior residences.

Table 1

VARIABLES INCLUDED IN HASE SURVEYS

A. Household Characteristics.

For all household members: Age, sex, education, current employment status, and relationship to head.

For heads of household: Race, ethnicity, age, education, industry, occupation, and wage rate for current and previous job periods (5 years).

For household: Compositional changes within last year, income (amount by source), assets.

B. Current Housing Circumstances.

For all households: Characteristics of housing unit (number and type of rooms, storage facilities, yard space, appliances, and utilities), condition of unit and respondents' level of satisfaction with various aspects of dwelling, location, and perception of neighborhood characteristics.

For renters: Relationship to landlord, responsibility for maintenance and repair, contract rent, utility expenses, and special considerations affecting rent.

For homeowners: Date, method, and cost of purchase, costs and terms associated with all mortgages, taxes and property insurance; expenses for utilities, and major remodeling and repair.

C. Prior Residences.

For all households: Locations, number of rooms, bedrooms, baths, type of unit, appliances, utilities, and heating system, condition of unit and respondents' level of satisfaction with various aspects of dwelling, perceptions of neighborhood characteristics, reasons for moving in and moving out, characteristics of household while in residence.

For prior renters: Monthly contract rent, responsibility for utility payments.

For prior homeowners: Sales price when sold.

D. Mobility Behavior.

For all households: Current mobility plans, reasons for plans, locations and dates of prior moves, length of stay in current residence, reason for choosing current unit, costs of moving household goods, types and amounts of utility and security deposits when moving to current residence.

E. Search Behavior.

For all households: Aims of search (desired tenure, unit type, and location), number of units examined, location of units examined, length of search, information sources used to find unit, types of problems and discrimination experienced during search, reasons for search, reason for choice of new residence or decision not to move.

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